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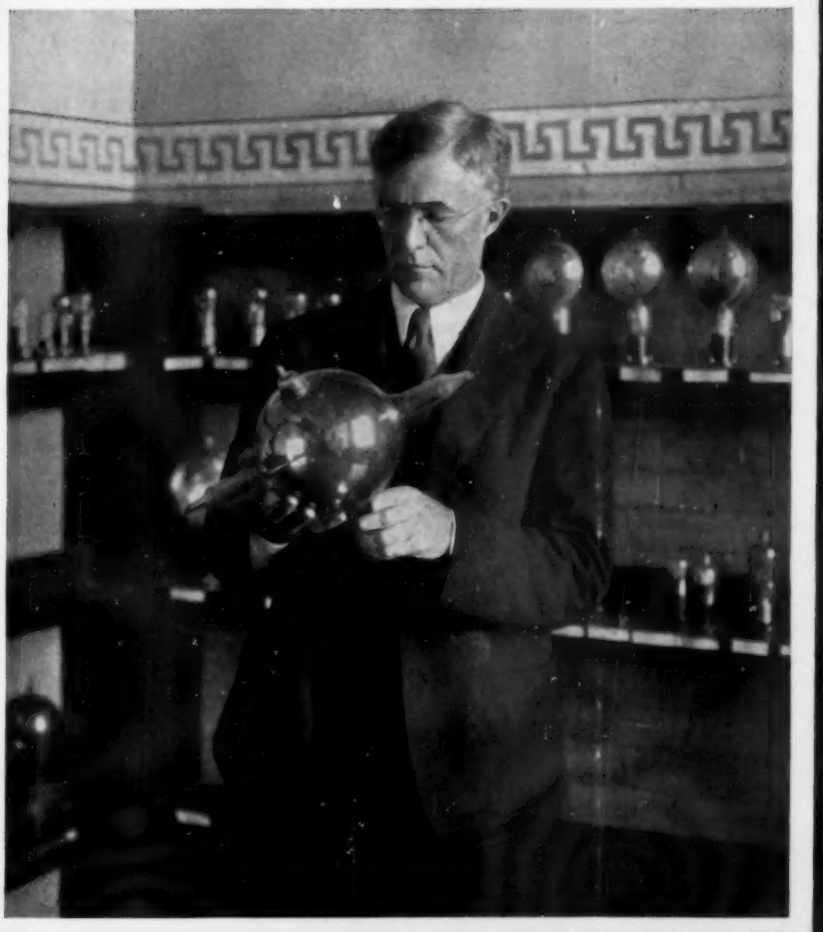
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



NOVEMBER 19, 1932

Dr. Irving Langmuir, Nobel Laureate in Chemistry 1932

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VOL XXII *No. 606*

The Weekly Summary of Current Science

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Edited by WATSON DAVIS

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? DO YOU KNOW THAT ?

The cultured Greeks of Sybaris in 700 B.C., had regulations against noise.

In Aurora, Ill., a father and daughter have kept weather records for 53 years.

Fully four-fifths of Arabian territory is consolidated into a kingdom under the new name of Saudi Arabia.

In order to bring eggs of the harlequin duck to England from the Arctic, a naturalist kept the eggs in an electric incubator while on the ship.

A tower of steel and aluminum twice as tall as the Eiffel Tower of Paris is proposed as a feature of the Century of Progress exposition in Chicago.

In the course of Gobi Desert explorations of the American Museum of Natural History, a surveyed line of more than 1,000 miles was run northwest through the desert.

Tests on the effects of smoking made at the University of Michigan Hospital indicate that when you smoke your fingers and toes are cooled from one to nine degrees, but at the same time blood pressure and pulse rate increase.

The Navajo Indians own about a million head of sheep.

When freshly cut, mahogany wood is not dark red but rather light red or pink.

A Hungarian chemist has determined that 100 per cent. of the nicotine in tobacco goes over into smoke.

Elevators that travel up and down in curved arcs are being built for ascent around the bulging sides of naval dirigibles.

American chemical technology began with the pioneer work of John Winthrop, Jr., who landed in Boston in 1631.

Among the Russian cities which have increased heavily in population are Moscow, which now has 2,800,000, and Leningrad, with 2,228,000.

Explaining why prehistoric potters made cooking vessels with rounded bases, a British archaeologist suggests that the rounded base would settle more firmly on stones or other supports in the fireplace.

WITH THE SCIENCES THIS WEEK

Curiosity arousing questions for the teacher and general reader. Book references in italic type are not sources of information of the article, but are references for further reading. Books cited can be supplied by Librarian, Science Service, at publisher's price, prepaid in U. S.

ANATOMY

Where is the extra rib Eskimo men seem to be acquiring? p. 325.

Do fish have a cerebral cortex? p. 328. *Brains of Rats and Men—C. Judson Herrick—Univ. of Chicago*, 1926.

ANTHROPOLOGY

When did head-hunting develop? p. 322. *Human Origins—George Grant MacCurdy—Appleton*, 1924, (2 vol.).

ARCHAEOLOGY

How thick are the walls of the recently unearthed eight-room-and-bath Mexican house? p. 325.

What were the Monte Alban tunnels used for? p. 329.

ASTRONOMY

What recent astronomical event was shown in movies at the National Academy of Sciences meeting? p. 325.

BIOLOGY

How much do lizards warm up when they sun themselves? p. 324. *Reptiles and Amphibians—Thomas Barbour — Houghton Mifflin*, 1926.

BOTANY

Who raised the first pumpkins? p. 330.

CHEMISTRY

How old is Dr. Langmuir? p. 319.

What is tertiary butyl alcohol good for? p. 329.

What is the best solvent for the rare earth elements? p. 330.

GENETICS

How long may pine pollen be kept fertile? p. 327. *Principles of Genetics—Edmund W. Sinnott and L. C. Dunn—McGraw-Hill*, 1932, $3.50.

HORTICULTURE

Who has been given most plant patents? p. 324.

MATHEMATICS

What is a differential analyzer? p. 320.

MEDICINE

How may banana powder be used? p. 324.

ORNITHOLOGY

How has the Washington Monument been killing birds? p. 324.

PALEONTOLOGY

When did hawks "go modern"? p. 330.

PHYSICS

What do upper air researches tell of cosmic ray origins? p. 321.

PHYSIOLOGY

How do pigeons test the potency of liver extract? p. 325.

What substance has the largest unit cell dimensions of any thus far recorded? p. 324.

CHEMISTRY

Nobel Prize in Chemistry Is Awarded Dr. Langmuir

Gas Filled Lamps, "tron" Tubes and Atomic Welding Are Merely By-Products of His Experiments in Pure Science

See Front Cover

THE AWARD of the 1932 Nobel prize in chemistry to Dr. Irving Langmuir, the General Electric Research Laboratory chemist, adds laurels to a system of investigation of nature's secrets as it recognizes a great scientist.

Langmuir has never been a mere inventor or applier of knowledge to pressing technical problems. He is a searcher after scientific truth. His fruitful technical developments, such as the gas-filled lamp, the "tron" tribe of vacuum tubes, and atomic hydrogen welding have been by-products of his "pure science" experiments. He aimed at understanding the stuff that matter is made of. One practical result alone, gas-filled incandescent lamps, is estimated to save America a million dollars a night on its light bill of over a billion dollars a year.

This tackling of fundamental problems in science and letting the results fall where they may is a notable and effective method of research that finds particular expression in great American industrial research laboratories. To Dr. Willis R. Whitney, who retired as director of the General Electric Research Laboratory a few days since and who picked Dr. Langmuir for his staff over twenty years ago, to Dr. W. D. Coolidge, a great physicist whose name is familiar on X-ray tubes and who is now director of the G. E. Laboratories, the award to Dr. Langmuir will give nearly as much satisfaction as though they had received it themselves.

Both Chemistry and Physics

If the Nobel prize award to Dr. Langmuir had been in physics instead of chemistry it would have occasioned little surprise, for although he is a chemist by terminology his work is in that borderland that is both physics and chemistry.

All of his achievements have resulted from his study of the fundamental nature of electricity, of atomic hydrogen, and of atomic structure.

Those more efficient electric lamps filled with nitrogen and argon gas instead of vacuum that we all use every day came nearly as a direct result of Langmuir's experiments made for the purpose of studying atomic hydrogen. It was for that reason that he first heated tungsten filaments in the gases at atmospheric pressure.

Atomic hydrogen welding, which produces the hottest industrial temperatures, came as the harvest of fifteen years of theoretical research on the dissociation of the hydrogen molecule.

Most Perfect Vacuum Pump

The electron tubes fathered by Dr. Langmuir and known by the names of pliotron, kenotron, magnetron, thyratron, dynatron, etc., were greatly aided by his development of the most perfect vacuum pump in existence. In the front cover illustration Dr. Langmuir is holding an historical experimental electron tube used in 1914 for radio telephone conversations between Schenectady, N. Y., and Pittsfield, Mass.

No book on physics or physical chemistry is complete without reference to Dr. Langmuir's work on atom structure, the adsorption of gases, the orientation of molecules, valence and isomorphism.

Since Dr. Langmuir is only 51 years old his pure science achievements will multiply. New industrial achievements will also continue to result from his older industrially unoriented experiments.

Dr. Langmuir is the seventh American scientist to be honored with a Nobel prize. Only one other American, the late Prof. T. W. Richards of Harvard, has been awarded the chemistry (1914) laureate.

The late Prof. A. A. Michelson, University of Chicago physicist, was the first American recipient of a Nobel award in science, when in 1907 he was honored for his work. The other American Nobelists, all living, are: Dr. Alexis Carrel of the Rockefeller Institute for Medical Research, medicine, 1912; Dr. R. A. Millikan, of the California Institute of Technology, physics, 1923; Dr. Arthur H. Compton of the University of Chicago, physics, 1927; Dr. Karl Landsteiner of the Rockefeller Institute for Medical Research, medicine, 1930.

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CHEMISTRY

New Laureate Explains His Present Work

By DR. IRVING LANGMUIR, winner of the Nobel prize in chemistry for 1932, in a special statement to Science Service.

EVERY scientific research man, to reach the greatest achievement, must have a deep curiosity and an intense enthusiasm for discovering new important facts or new relations between known phenomena. During the course of his work he derives great pleasure from the progress he makes in these directions. His greatest satisfaction, however, is to see that his results are willingly used by others and is derived particularly from the recognition that his work receives from his fellow investigators.

My own work has been in the field of both chemistry and physics. I have been especially interested in the mechanism of chemical reactions which take place on solid surfaces.

At the present I (*Turn to Page* 328)

GENERAL SCIENCE

Award Should Stimulate Industry to Foster Science

By DR. W. D. COOLIDGE, director of the General Electric Research Laboratory, in a special statement to Science Service.

THE FOUNDERS of the research laboratory of the General Electric Company had seen a new industry grow up around the fundamental scientific work of Faraday and others, and, men of vision that they were, they saw that they should not be content merely to apply the principles discovered by others, but should themselves support such fundamental research and so aid in the discovery of new principles for the further development of the art.

This led to the establishment by Dr. W. R. Whitney of a new type of industrial research laboratory, devoted largely to fundamental research. From the beginning Dr. Whitney insisted that each research worker should be free to publish his results in (*Turn to Page* 331)

METEOROLOGY

Anemometer Turns Back In 140-Mile Mountain Gale

IN THE RECENT 140-mile-an-hour gale the anemometer on the Mt. Washington Observatory did not quite turn so fast as to catch up with itself from behind, but it did the most surprising trick of turning backward and unscrewing itself. Then it spun upward, lifting its foot-long spindle out of the pipe shaft and sailed 200 feet away. It landed upright, embedding the lower part of the steel spindle in the frozen ground. But the wind was so strong that it bent the steel over till the cups rested on the ground.

This unusual performance of the anemometer was owing to its having become so encased in rime, or mountain frostwork, that the irregularities in the rime were better wind catchers for a reverse motion than the frost covered cup projections were for forward motion.

The speed of the 140-mile wind was determined by Observer S. Pagliuca who held a hand anemometer to the gale. The other three men must have held Pagliuca while he was doing it, for a wind of this velocity is eight times as strong in its actual push as is an ordinary gale of 35 miles an hour. A 35-mile wind is enough to make walking difficult, but a 140-mile wind, pushing a man sideways with a force of about 200 pounds, is enough to blow him away. In the Miami hurricane of 1926 wind velocity reached 134 miles an hour.

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GENETICS

Yogo is New Wheat For Northwest

YOGO is the name given by the U.S. Department of Agriculture and the Montana agricultural experiment station to a new variety of winter wheat, bred specially to meet climatic and plant-disease problems in Montana and surrounding states. It is reported to be very hardy, of good yield, and highly resistant to the destructive fungus, stinking smut. It is hoped that seed enough for general distribution will be available after the 1933 crop has been harvested. The new variety was named for the Yogo, a small stream flowing near the Moccasin station, where it was first grown.

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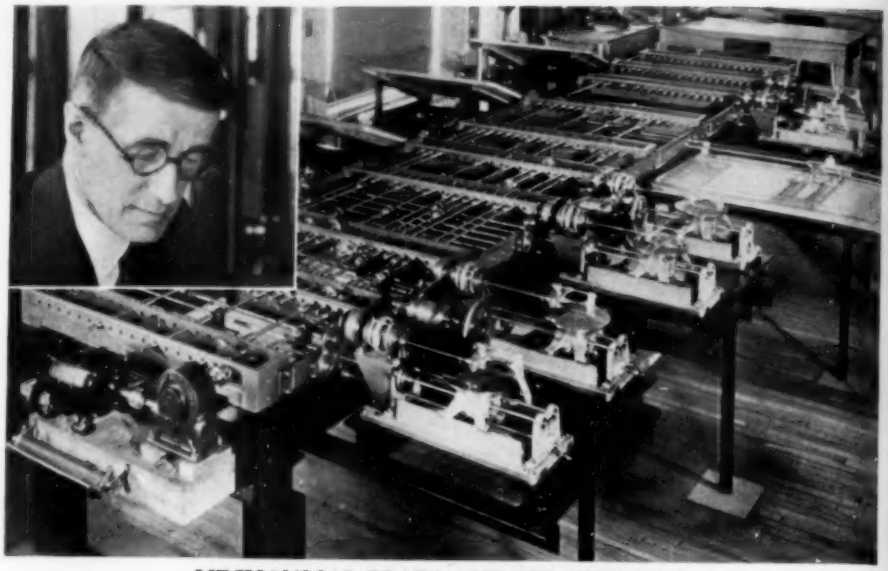

MECHANICAL BRAIN AND ITS DESIGNER

Calculating machines even more powerful than this one are to be built.

MATHEMATICS

Intricate Mathematical Brain Solves New Physics Problem

THE NEW mathematical "brain" machine at the Massachusetts Institute of Technology has solved over a thousand equations in some thirty problems and now plans are under way for the construction of more powerful such differential analyzers in the near future, Dr. Vannevar Bush, vice-president of the Massachusetts Institute of Technology, told the National Academy of Sciences.

One of the most important services of the new machine is the solution of the Schrödinger wave equation for various atomic numbers, a necessary procedure in developing the new ideas in physics. Without its aid the task would have consumed much time. The differential analyzer, Dr. Bush said, makes possible the obtaining of the solution for each atomic number in two days with a single operator at the machine.

"Experience has shown that a precision of somewhat better than one part in one thousand can be attained consistently from individual units under average conditions of operation," Dr. Bush said, "the overall precision depending upon the specific nature of the problem. Errors due to manual following of curves average out to such an extent that their effect can be made less than that of machine errors.

"Studies of transients in synchronous machines have especially illustrated the types of problem in which large numbers of specific solutions are necessary. The Thomas-Fermie equation, and the same equation after introducing the relativity correction, illustrate the solution of non-linear equations, the introduction of difficult boundary conditions, and the attainment of precisions by solving for departures.

"Several constructional additions have been made to improve precision and convenience. Recording has been made precise by an automatic printer capable of giving five figures on six variables."

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NEWS from the National Academy of Sciences

meeting at the University of Michigan, Ann Arbor, Mich., Nov. 14-16, is reported throughout this Science News Letter.

PHYSICS

Ionosphere Rays Possible As New Name for Cosmic Rays

Dr. Arthur H. Compton's Researches Indicate That Cosmic Rays May be Atmospheric Electrons, Not Space Waves

DR. ARTHUR H. COMPTON'S new hypothesis suggests that the cosmic rays originate not in the depths of interstellar spaces but in the earth's own upper atmosphere only some hundreds of miles above our heads. If it is sustained by time, a new name will be needed for these penetrating radiations. Perhaps they will be called ionosphere rays.

The University of Chicago physicist and Nobelist reported to the National Academy of Sciences meeting at the University of Michigan, just as Dr. Robert Andrews Millikan, also a Nobel prizeman in physics, at the equivalent autumn meeting of this Senate of American Science just seven years ago, called the attention of scientists and the public to the importance of studying the cosmic rays.

Rays Become Earthly

Dr. Millikan then characterized the cosmic rays as super X-rays or super gamma rays and saw them as "birth cries" of the formation of atoms in the distant spaces between the stars and the nebulae. This idea was seized upon as an escape from the running down or heat death of the universe, evidence that heavier elements were being built somehow from hydrogen and helium.

Now, after gathering new data in a fifteen-month world survey conducted by himself and some sixty physicists in all parts of the globe, and after analyzing the multitude of experiments made in nearly every center of physics since Dr. Millikan's 1925 report, Dr. Compton says: "Cosmic rays may be satisfactorily explained if we suppose that the cosmic rays consist of electrons originating some hundreds of miles above the surface of the earth in the upper atmosphere. It seems very difficult to reconcile with our data any of the alternate hypotheses that have been suggested."

If further interpretations of the Compton survey and experiments of the future uphold this conclusion, the cosmic rays become earthly and lose their cosmic nature. They also will be recognized as very energetic electrical particles or electrons and not electromagnetic radiations in the same family as light, X-rays and the penetrating rays from radium.

There have been two schools of physicists during these exciting years when cosmic rays have been a favorite experimental subject. One has held with Millikan and the other with Compton.

Three lines of evidence converged in pointing to an origin for the cosmic rays in the upper ionized region of the earth's atmosphere, where also originate the aurora borealis or northern lights and where the radio waves are reflected. These are: variation with latitude upon the earth, variation with altitude and variation between day and night.

Dr. Compton's survey, in which electroscopes were taken into the arctic and the antarctic near the magnetic poles and to many places in between, revealed a markedly less intensity of cosmic rays near the equator. As latitudes increased north and south, the rays increased. This was a variation with the magnetic field of the earth. At high altitudes above the earth intensity of the rays approaches a constant value, a fact that upholds Dr. Compton's idea. In high mountains of Tibet and Peru experiments were made, and the balloon flights of Piccard, the Belgian, and Regener, the German, gave additional support.

In fact, Piccard in last summer's record altitude ascent in his aluminum gondola took ion counters that allowed him to tell whether the rays were bombarding him from above or from the sides. At the earth's surface few rays come sideways. At some ten miles up Piccard found no difference between the number of rays passing horizontally and those passing vertically. This supports strongly Dr. Compton's idea that the rays were originating in the thin air where the balloon was floating.

Day and night conditions, particularly at high altitudes, show changes in cosmic ray intensities, and this fits in with Dr. Compton's magnetic theory.

What in the ionosphere or the upper air gives birth to the electrons Dr. Compton did not suggest. He feels there is still the possibility that a portion of the rays may consist of electrons coming from outer space. He did say, however, that we know they have some important message for us. He said:

"Perhaps they are telling us how our world has evolved, or perhaps they are bringing news of the innermost structure of the atomic nucleus."

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PSYCHOLOGY

Sleep Comes From Relaxed Muscles, Not Tiring Work

SLEEP depends largely on the tone of the muscles. When the muscles are relaxed, there is a lessening of the impulses from them to the brain, so that it becomes difficult to stay awake. This relaxation and consequent sleepiness normally takes place regardless of whether or not tiring work has been done.

These conclusions were reached in the course of studies of efficiency reported by Dr. Nathaniel Kleitman of the University of Chicago to the National Academy of Sciences meeting at Ann Arbor.

Dr. Kleitman's studies of performance showed that there is a gradual increase in muscular relaxation during the day. On going to bed this relaxation becomes still greater, which precipitates sleep.

The body temperature shows a curve similar to that of muscular relaxation, rising up to noon or afternoon and then decreasing for the rest of the waking period. Since body temperature is an indication of change in muscle tone, Dr. Kleitman assumes that the decrease in efficiency in the afternoon, paralleling the decrease in temperature, is due to greater muscular relaxation.

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ANTHROPOLOGY

Cave Man Lover

Cave Gentlemen Who Gave Their Women a Square Deal, Is an Idea Developing From the Finding of Primitive Art

By EMILY C. DAVIS

WHEN the Stone Age cave man's eye fell upon the maiden of his choice, he did not hesitate. Striding up to the cave woman, he took her fiercely in his arms. Timidly, she shrank away. But with one light, sure blow of his club he laid her helpless at his feet. Then, stooping, he clutched her long hair and dragged her off to his cave, his chosen mate.

So runs the traditional love story of the big, virile cave man and the shrinking, submissive cave woman.

It is a popular story. It has made the cave man a hero and a symbol. Many a romantic maiden of our own Steel Age has sighed her preference for cave men.

The only trouble with the story is that it can be traced back to its origin. And the origin wasn't anything that happened 20,000 years ago, when cave men walked the earth and went out wife-hunting. The cave man lover is a tradition no older than the imaginations of grandfather and grandmother, who discussed such things in the Victorian Era. The story was one of those gossip stories that grow bigger and better every time they are told, until they crystallize and become folklore.

Cave Psychology Forgotten

The truth is, science realizes today, that the cave man's psychology is lost and forgotten information, almost beyond hope of recall.

That being the case, you can understand the eager interest of a French archaeologist, Count René de St. Perier, when he was digging recently in the Grotto of Isturitz, in southern France, and unearthed a bit of rare archaeological treasure. It was a Stone Age artist's picture of a man and woman together. The picture, according to St. Perier's speculation, appears to have something to do with courtship—the courtship of one of those mysterious cave men.

The man in the picture has no club, but in the leg of the woman is lodged a barbed dart. If the Count de St. Perier is right, and this is a love-scene, it would seem that darts, not clubs, were the weapons of Cupid in the Old Stone Age.

The curious little picture has brought the cave man and cave woman into the scientific limelight. American anthropologists have disagreed with the French scientist's interpretation. In the clash of opinions there emerges a new American theory of the cave man as a fair-minded human being who gave the women folk a squarer deal than women have gained later in many a civilized society.

The controversial picture was discovered by the Count de St. Perier in a cave-apartment where many people of the Stone Age long ago took shelter. In the floor of the cave, explorers have unearthed harpoon points of bone and stone, broken stone ornaments, and animal bones from many dinners, all lying buried in layers of occupation.

With such objects as this belongs the important bit of Stone Age art. The unknown artist of the Magdalenian period, some 20,000 years ago, choose for his art medium a long piece of bone. On this, with a sharpened tool, he engraved his pictures. He decorated both of the flat faces of the bone.

On one side, the artist outlined a shaggy bison, wounded by two barbed darts and rushing along in desperate, snorting fury. Such pictures of the hunt were popular art subjects in the Magdalenian period of the Old Stone Age. Some archaeologists consider that the hunting pictures may have been used in sympathetic magic. That is, the hunter would have portrayed in art the scene he hoped to enact. He believed that making a picture of a wounded bison would put the real bison in his power, so that it could not escape his aim.

The bison found in the Grotto of Isturitz is so skilfully engraved that it is hard to believe that the same artist would have turned out the crude and awkward picture of a man and woman found on the other side of the bone.

In order to depict the man and woman together, the artist placed the woman above the man. At least, so they appear when the bone is held vertical. The French archaeologist suggests that the artist meant the man and woman to be understood as standing side by side.

The woman's head is broken off, in damage done in ancient times. Her ornaments may still be seen. She wears a necklace and around her ankle is a bangle.

The man has bobbed hair and a receding forehead, continues the French archaeologist's description. Like the woman, the man wears a necklace and bangle. Both of the figures have their hands raised in a gesture which might be one of supplication.

Key to the Story

But the most important feature of the picture, by far, is the little barbed point sticking in the woman's leg. That dart is the key to the story.

"What is the meaning of this strange scene?" asks the Count de St. Perier in a report to the French journal *L'Anthropologie*.

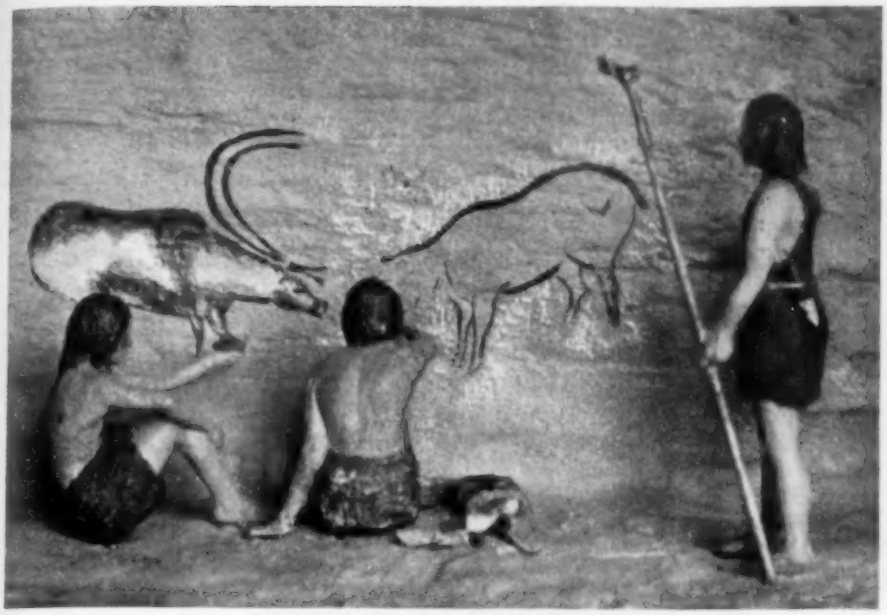
It is not a fight nor a slaying, he reasons, in spite of appearances. War scenes in Stone Age art are known, but not one of them has ever shown a woman in the fray. Moreover, he points out critically, the attitude of the man does not appear hostile.

He concludes: "It seems more reasonable to interpret the dart as a symbol implying the idea of a conquest, no slaying involved."

The Count is thus suggesting that Stone Age lovers employed sympathetic magic. It would mean that the Stone Age lover, like the Stone Age hunters, did not trust to his own strength and brains in an important engagement. He felt safer if he had worked a few charms to insure victory.

If the cave man did indeed make pictures of himself shooting down his chosen bride, it does not necessarily follow that he reproduced the scene in reality—shooting a real harpoon point into the leg of the woman. The dart in the picture might be nothing more than a symbol of conquest, like Cupid's arrow on a valentine.

Don't forget that a prehistoric cave man looking at a modern valentine, with its cherubs shooting arrows at fat red hearts, might possibly draw some far-



STONE AGE ARTIST AT WORK

A chieftain directs and an assistant stands by holding a lamp. Animals and men are common subjects of the primitive artist, but pictures of men and women together are rare.

fetched conclusions that twentieth-century suitors went a-wooing with bows and arrows.

The Count de St. Perier contents himself with saying that he thinks the scene was the sympathetic magic of a Stone Age lover.

Even that is more than some American anthropologists will allow, after examining the evidence. Taking issue with the Frenchman's theory, Dr. John M. Cooper of the Catholic University of America declares that the fragment of Stone Age art might be interpreted in a variety of ways.

The man and woman might be dancing; or going through a religious ceremony. Injuries deliberately inflicted are far from rare in ceremonies among primitive tribes.

Woman in Hunt?

Another interpretation—the scene might be a record of something that had happened. Perhaps the man and woman took part in the bison hunt on the reverse side of the bone. The woman's injury could thus be accidentally incurred in the attack on the raging bison.

There are other possible interpretations. The picture is quite literally a problem picture. Dr. Cooper would say that one suggestion explaining it is about as good—or as bad—as another, considering how very little is known about the social and domestic life of the Old Stone Age.

Archaeologists can dig up direct evidence of the industries, arts, and other material culture of the Stone Age cave men. But the earth does not preserve direct evidence of the courtship customs, rites, and beliefs of those people.

There is an indirect method, however, of getting at the question. That is by studying primitive people who live today on an economic and social level approaching that of the Old Stone Age thousands of years ago. Some of these modern tribes, in African jungles, in the Australian bush, or Oceania, are, or were until very recently, living literally in the Stone Age. Civilization left them alone.

From study of these primitive groups, who represent the nearest approach to civilized man's past, Dr. Cooper concludes that the popular notion of the brutal cave man and the down-trodden cave woman is most unfair. The cave woman probably enjoyed equal rights as women have seldom enjoyed them in more advanced society.

"Among the most primitive peoples," he explains, "the average woman is far from being the drudge, the abject slave, and oppressed inferior she is often pictured and described as being. Among these peoples, woman's position is quite good. Or, perhaps it would be more accurate to say that her position depends on her own personality. If she is able, of good character, or strong personality, she counts in society; otherwise, not. Cases of henpecked husbands are far from rare at all levels of culture."

The more marked oppression and exploitation of women, Dr. Cooper believes, did not exist in the dawn of human society, when life was very simply organized. It was in the "middle ages" of social evolution, when men turned from being hunters to being settled farmers and herdsmen, that women were relegated to subordinate positions. Men then became the property owners, men the strong fighters. So, men were the beings who spoke with authority.

Evils From Middle Ages

It was in the middle ages of human culture, Dr. Cooper points out, that many undesirable institutions appeared. To this stage of man's development belong head-hunting, organized warfare, human sacrifice, torture of prisoners, slavery, cannibalism. These institutions, like those that subjugated women, were seemingly not present in primitive society.

How the cave woman came to be known as a down-trodden creature is explained by Dr. Cooper, who traces it back to the Victorian Era. At that time, human history suddenly took on a new long-distance perspective. New biological conclusions were coloring ideas in other subjects. So, pondering man's past, the Victorians complacently reasoned that human society must have changed greatly for the better throughout history.

Our own age, they assumed, is the finest flower of civilization. So they looked back upon the dimly-seen figures of Stone Age man and woman and shuddered to think what darkness and brutality must have clouded that long-ago existence. Stone Age man must have been a beast. And Stone Age woman must have led a terrible life.

Since then, Dr. Cooper points out, science has enormously increased its facts. Scientists know today how very complex human society is, and how irregular its progress.

Sometimes, as the material civilization advances, the status of woman improves; then again, it is retarded. There is little connection between the two factors.

It does appear, however, that Stone Age man and woman set a fairly high standard in women's rights. As the facts and probabilities emerge, it seems that the modern maid who sighs for a cave man may be wishing for a quite desirable sort of mate, after all.

ORNITHOLOGY

Floodlighted Monument Lures Birds to Death

SONGBIRDS flying south have been finding a literally fatal attraction in the floodlighted Washington Monument in the National Capital. The great marble shaft has been bathed in strong light from bottom to top ever since late last autumn, but it was not until the present migrating season that small birds have been found dead at its base in the morning. Since Labor Day several hundred of them have been picked up, and scientists of the U. S. Biological Survey are expressing some concern over the matter. The migrating birds, apparently blinded by the lights, dash against the monument. Some of them are merely stunned, and after a while recover and fly away, but others are either killed outright or injure themselves so badly that they die. Similar bird tragedies have long been an unsolvable but unavoidable problem around lighthouses. The hapless little victims of the Monument's brightness do not give their lives wholly in vain, for their skins are added to museum collections.

It is probably out of the question to save the birds by darkening the Monument again, for the floodlights not only add greatly to its beauty but also eliminate it as a menace to aerial traffic. Washington's principal commercial airport is directly across the Potomac from the Monument grounds, and before the floodlighting was installed pilots constantly complained of the danger to night landings caused by this massive stone needle rising 555 feet into the air. Illumination of its top only was tried, as well as installation of red lights in its upper windows. But these measures were not wholly satisfactory, and the airlanes were felt to be safe only when the entire shaft was floodlighted.

Science News Letter, November 19, 1932

HORTICULTURE

Burbank, Though Dead, Gets Most Plant Patents

LUTHER BURBANK, noted plant breeder, has been granted his seventh posthumous plant patent by the U. S. Patent Office.

His latest patent covers a new variety of cherry tree "characterized by its vigor of growth, the toughness of its wood, and the large size and absence of susceptibility of cracking and rot of its fruit." Burbank has so far been granted more patents through his executrix, Elizabeth Waters Burbank, than any other plant breeder. Five of his patents issued this year are for new varieties of plums and one for a yellow freestone peach.

Three other plant patents have been issued recently, making a total of forty-three patents issued since the plant patent law was passed a little more than two years ago.

Included in the new plant patents are a variety of barberry without spines; a new grape characterized by its early ripening, exceptionally large size, and superior quality of its fruit; and a freesia having a "long, pure white, gracefully tapering perianth and flat opening floral segments."

Science News Letter, November 19, 1932

BIOLOGY

Mother Lizards Sunbathe To Warm Their Eggs

LIZARDS do not as a rule "set" on their eggs like hens, but one or two genera of them do, and these poor cold-blooded creatures have to warm themselves up by taking sunbaths or exercising. And at that they can raise their body temperatures only two or three degrees Fahrenheit (1.3 degrees Centigrade). It hardly seems worth the trouble.

These facts of reptilian maternity were part of the study reported at the meeting of the National Academy of Sciences meeting in Ann Arbor by Dr. G. K. Noble and E. R. Mason of the American Museum of Natural History.

Their research concerned itself primarily with the ways in which reptiles absorb water, and the bearing of these facts on the animals' choice of habitats.

Lizards, they found, can absorb water readily through the skin on the underside of their bodies, whereas snakes get very little water in this way. Frogs, a step down in the evolutionary scale, can absorb water through any part of their skin.

Lizards in damp habitats lose and absorb greater amounts of water than do those frequently arid regions. Burrowing lizards have a more permeable skin than surface species have. Lizards' body temperature is depressed when the environmental temperature is raised; and this depression becomes greater upon the intake of water, whether by mouth or through the skin.

Science News Letter, November 19, 1932

IN SCIE

MEDICINE

Bananas May Aid in Treating Disease

POSSIBILITY of bananas having a new use in the treatment of intestinal disturbances caused by certain germs was suggested in a report on the health value of fruit juice beverages given by Dr. Walter H. Eddy of Columbia University at the Washington meeting of the American Public Health Association.

Dr. Eddy justified his inclusion of the banana in a discussion of fruit juice beverages by explaining that the development of banana powder and sugar made it possible to use the fruit in milk or other forms of beverage.

His studies with bananas and other fruits showed that in addition to their already known valuable properties, fruits are able to make other food factors, such as calcium, more utilizable by the body.

Science News Letter, November 19, 1932

PHYSIOLOGY

X-Rays Show Pattern Of Insulin Crystal

INSULIN, secretion of the islands of Langerhans in the pancreas which regulates the body's use of sugar, has the largest unit cell dimensions of any substance thus far recorded, X-ray investigations of the crystal form of insulin show. This evidence of the complex nature of insulin was brought out in a report by Prof. George L. Clark and Dr. Kenneth E. Corrigan of the University of Illinois to the National Academy of Sciences meeting at Ann Arbor.

Although it is barely ten years since insulin was first used to treat diabetes, efforts to determine its crystalline structure by means of X-rays have been going on for over two years. Prof. Clark and associates have found that the crystal is monoclinic and that upon the basis of a molecular weight of 35,000 there are 24 molecules to the unit cell.

Science News Letter, November 19, 1932

E FIELDS

PHYSIOLOGY

Potency of Liver Extract Is Tested on Pigeons

THE POTENCY of liver extract and certain other preparations used in the treatment of pernicious anemia may be determined by a test with pigeons. Details of the test were described by Dr. C. W. Edmunds of the University of Michigan before the National Academy of Sciences meeting in Ann Arbor.

Following the discovery that liver and stomach preparations could be used successfully in treating this hitherto fatal disease, physicians were faced with the need for a laboratory test of their potency. Until now the potency of a preparation could only be determined by its effect on the patient.

The pigeon test is based on the discovery of Drs. Janet M. Vaughan, Gulli Lindh-Muller and associates that clinically potent liver extracts increase the number of reticulocyte cells in pigeon's blood. Dr. Edmunds and associates at the University of Michigan have developed their test from this discovery.

While their results indicate that the pigeon test will be a reliable one, they do not offer it as a final answer to the problem, but suggest that further study be made to determine its value. They emphasize the necessity for careful technic in the use of this test.

Science News Letter, November 19, 1932

ASTRONOMY

Scientific Movies Show Star Eclipsed by Moon

MOTION PICTURES of the moon occulting a star were shown for the first time at the meeting of the National Academy of Sciences in Ann Arbor on Monday, Nov. 14. They are believed to be the first such pictures ever taken of such a "little eclipse."

The occultation took place on the night of Saturday, Nov. 5, when the moon slid in front of the star known as delta Capricorni. The film showed the moon creeping up to the star and suddenly snuffing it out, and then, after a time, showed the star as suddenly reappearing from the other side of the moon.

The occultation film was a part of an astronomical "movie" show put on by Robert R. McMath, H. S. Hulbert and F. C. McMath, of Detroit. Other features of the film they showed included pictures of sunrise and sunset on the craters of the moon, and the motion of the satellites, or moons, of the planet Jupiter. (*SNL, Oct.* 22, '32, *p.* 258).

Science News Letter, November 19, 1932

ANATOMY

Eskimo Men May Be Getting Extra Rib

ESKIMO men may be getting an extra rib. If so, it is apparently a case of evolution, according to Dr. T. D. Stewart, physical anthropologist of the Smithsonian Institution, who has just reported the appearance of the extra rib. Laymen who remember their Bible, however, may consider it a step backward towards Adam, who was said to have lost a rib when Eve was created.

About 12 per cent. of some 200 Eskimo skeletons which Dr. Stewart examined had 25 instead of the customary 24 presacral vertebrae. The condition was present in nearly 16 per cent. of the males but in less than 1 per cent. of the females. It was considerably more frequent in skeletons secured north of the Yukon River.

The extra vertebra is apparently being added in the thoracic and lumbar region.

In his report to the *American Journal of Physical Anthropology,* Dr. Stewart does not try to explain this anatomical variation. The geographic distribution and the predominance of the anomaly among males suggest a possible hereditary factor.

Whether such an extra vertebra would have any particular advantage or disadvantage for the survival of the individual is not known.

Other races besides the Eskimo have shown this tendency toward getting an extra rib, previous studies have shown. The frequency among the northern Eskimo, however, is nearly twice as great as the maximum recorded before. Among Europeans it runs from 3 to 6 per cent., while one study of Japanese showed a frequency of slightly over 7 per cent.

Science News Letter, November 19, 1932

ARCHAEOLOGY

Eight-Room-and-Bath House Unearthed in Mexico

AN EIGHT-ROOM-and-bath house which has just been discovered in the prehistoric city of Calixtlahuaca, north of Toluca, is pronounced unique in Mexican archaeology. The discovery was made by Jose Garcia Payon, who is directing the excavations.

Living quarters of ancient cities are rarely found by archaeologists, apparently because they were not constructed of the durable materials used in public buildings. Sr. Garcia's prehistoric house has walls of stone and earth more than two feet thick, and plaster floors. Although the roof is gone and the walls are broken down, there is evidence of possibly a second story. The bathroom has a temaxcal, a beehive-shaped sweathouse built of stone such as the Aztecs and other Indians used.

The house is more than 75 feet long, and its ruins lie at the bottom of hills crowned with pyramids and other public buildings.

Calixtlahuaca, one of the most recent archaeological cities discovered in Mexico and one of the largest, has the only round Aztec pyramid known on the Mexican mainland.

Science News Letter, November 19, 1932

PHYSIOLOGY

Lack of Vitamin A May Cause Kidney Stones

EVIDENCE that lack of vitamin A in the diet may be the cause of kidney stones has been reported by Drs. C. A. Elvehjem and V. F. Neu of the University of Wisconsin. These investigators found that in birds the kidneys undergo definite, harmful changes when the birds are deprived of vitamin A.

Other investigators, Drs. T. B. Osborne and L. B. Mendel in this country and Dr. Robert McCarrison in England, observed a similar relation between kidney stones and lack of vitamin A in laboratory animals. Recalling that kidney stones are particularly prevalent among peoples of the Far East, Dr. McCarrison fed animals on diets made up of foods common in India. More than one-fifth of the animals developed kidney stones. When vitamin A was added to their East Indian diet, the animals did not have kidney stones.

Science News Letter, November 19, 1932

BIOLOGY

Red Corpuscles of the Blood

"A Classic of Science"

Leeuwenhoek in Holland Studied the Microscopic World And Wrote of His Discoveries to Friends in England

MICROSCOPICAL OBSERVATIONS FROM M. LEEUWENHOEK. In Philosophical Transactions of the Royal Society: giving some Accompt of the Present Undertakings, Studies and Labours of the Ingenious in many Considerable Parts of the World. Vol. IX. London: MDCLXXIV (1674). [*Englished by the Secretary of the Royal Society*]. *This is an exact reprint of extracts from the original publication.*

I HAVE divers times endeavoured to see and to know, what parts of the *Blood* consists of; and at length I have observ'd, taking some Blood out of my own hand, that it consists of small round globuls driven thorough a Crystalline humidity or water: Yet, whether all Blood be such, I doubt. And exhibiting my Blood to my self in very small parcels, the globuls yielded very little colour. . . .

The small Red Globuls in the Blood, formerly spoken of, are heavier than the Crystalline liquor in which they are carried, because soon after that the Blood is let out of the Veins, those Globuls by little and little subside towards the bottom; and being made up of soft fluid Corpuscles, and many lying upon one another, they do unite themselves close together, and by this close conjunction the Blood that is under the surface alters its colour, and becomes dark-red or blackish; as I have observed several times: of which I take the reason to be, (with submission to better Judgments) that the Air cannot move every way round about the Globuls, and hits as 'twere against a close darkish body. Touching the *Florid* red colour of the surface of the Blood exposed to the Air, that comes, in my opinion, from hence, that the *uppermost* Globuls are not press'd, and therefore retain their nature, and the Globuls *subjacent* to the uppermost lye close together, by reason of which close conjunction the Air or Light cannot penetrate through them, but is reflected, and so gives a greater light to, and about, the uppermost Globuls, than they had before the union of the inferiour Globuls; and this it is that makes them appear more florid.

I shall herewith communicate the Manner *how* I have observ'd, among other things, *Blood* and *Milk*. I did my self prepare divers sorts of very slender hollow Glass-pipes, of which some were not thicker than a mans-hair; and the slenderer they are, the clearer will they make the red Globuls of the Blood appear. But, for seeing the Crystalline water in which those Globuls move, and for observing also how they subside, these Pipes may be made somewhat thicker. Having then made ready such a small Pipe, I tye about the uppermost joynt of (e.g.) my thumb a string, as is usual in opening a Vein of an Arm, and then I prick that part of my thumb with a pin, to make it bleed; this blood I wipe off, if I intend to keep any for the Air. And then I look well to the place prick't, putting upon that point my Glass-pipe, and withal squeesing my thumb to press out more blood; which being thus press'd out, will in part run up into the said pipe: This pipe with the blood in it, I lay upon a piece of white paper, and with my nail break a little piece from it, and set it to the pin of my Microscope, having first a little wetted the pin with my spittle, or a little turpentine, to make the pipe stick to it; or else I take the whole Glass-pipe, and with my hand hold it before the Microscope. Now in such a Glass-pipe, the blood on the surface, and that which is under it, is almost of the same colour, although it stand a pretty while in it, because the Globuls in the Glass-pipe are but few, nor lye they so close together. The slenderer the pipe is, the higher will the blood rise into it. And that the Curious in your parts might themselves see this, I have used the freedom of sending you some of the said hollow Pipes, by the means of which I hope my above-mention'd speculations will be verified.

The red Globuls of the Blood I reckon to be 25000 times smaller than a grain of sand; which perhaps will to many seem incredible: But the matter being about figured Bodies, 'tis known, that, two Globes being given, the Axis of one whereof is 1, and that of the other, 20, the proportion between their magnitudes is as 1 to 8000; Spheres being in a triplicat proportion to their Diameters. The same red Globuls, when they are single, and stick within to the sides of the Glass-pipes, will appear white and colourless.

Further, if your Curiosity shall lead you to observe the motion of those red Globuls thorow the Crystallin liquor, be pleased to take one of the thicker sort of these pipes, filling it partly with blood, and so putting the lower end a little into the flame of a Candle, and closing it hermetically. Which done, set the pipe upright, with the other end upwards, that so the red Globuls may sink. And desiring to see the motion of those Globuls, apply a little warmth to the pipe, making use only of a warm hand; by which warmth the Air must expand it self into a greater space, and the blood in the pipe will be driven up higher; by which means the red Globuls will in part come to move above in the Crystallin humidity; yet if those Globuls come to joyn themselves too close together, this Observation will fail.

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Anton A. Leeuwenhoek, born in 1632, in Holland and Robert Hooke, his contemporary, in England, were two pioneers in making and using microscopes. Hooke's instrument was very similar to the compound microscopes in use today, while the Dutch scientist preferred a single lens of very short focal length for most of his observations. Leeuwenhoek's discovery of microbes (1676) was published in the SNL Oct. 18, 1930. Hooke's discovery of cell structure was the first "Classic of Science" published, SNL Sept. 17, 1927.

DR. IRVING LANGMUIR, Nobel Prizeman in Chemistry, will describe some of his applications of chemical principles to modern life in

THE NEXT CLASSIC OF SCIENCE

PINE'S BRIDAL CHAMBER

Sealed against unwanted matings with wind-borne pollen, these pine flowers are being fertilized with selected pollen sprayed upon them by a hypodermic needle thrust through their enclosing bag.

GENETICS

Hypodermic Needle Carries Pine Pollen for Hybrids

HYBRID pines and other trees, to grow better lumber in less time, are the goal of the Institute of Forest Genetics, with headquarters at Placerville, Calif. Several new tricks of botanical technique have been developed to speed the work, one of the most interesting of which is the use of a hypodermic needle for pollinating the female pine flowers, which develop into the seed-bearing cones.

Under natural conditions, pines and similar trees are wind-pollinated. Their female flowers open and receive pollen shed into the air by the male or staminate flowers, and carried by the wind in yellow clouds.

This is obviously a most unselective process. One can select a good mother for one's crop of seeds, but their fathers are wholly unknown, as chance and capricious as the wind itself.

To insure a knowledge and control of the paternity as well as the maternity of their seeds, the botanists tie close-woven canvas bags over the twigs bearing unopened female flowers. Celluloid windows in the bags permit them to see when the flowers open. No chance wind-borne pollen can reach these cloistered pine-flower virgins. They are as strictly (*Turn to Page* 330)

PHYSIOLOGY

New Communication System Discovered in Animal Body

"Neurohumor" Secretion, Passing From Cell to Cell, Relays Messages From Nerve Centers to Peripheral Regions

AHITHERTO little recognized transmission system between cells of animal bodies, including those of man, was reported upon to the National Academy of Sciences meeting at Ann Arbor this week by Dr. G. H. Parker, director of the zoological laboratories of Harvard University.

Dr. Parker declared that this physiological mechanism that allows one cell to influence another by producing and sending a "neurohumor" secretion from cell to cell is "of as great importance as the blood or the lymph," which have been long known as conveying substances within the living body.

Recent extensive researches in America and abroad have caused scientists to conclude that the sense cells of the living organism produce secretions of a peculiar sort. Dr. Parker christens the secretion "neurohumor." Deeper-lying nerve fibers and nerve cells are activated by the neurohumor secretions of the sense cells, and the excitation thus conveyed to the central nervous organ sets up at the central termination a similar secretion which excites the next nervous element in the chain.

Finally a secretion relaying the original orders of the sense cells is produced at the peripheral end-organ such as a muscle, gland, or other portion of the body that does a certain piece of work.

Dr. Parker finds that the secretions pass in solution over the narrow spaces that separate one nervous element from the next and that they are in the nature of hormones or humoral substances.

When more is known about them, it is expected that they may explain some obscure nervous diseases, since Dr. Parker declared that the neurohumoral substances are presumably of first importance in many such ailments.

Neurohumors can be experimented with in fishes and other animals that can change color. Dr. Parker injected some of the tissue juice of a light-colored fish under the skin of a dark-colored fish and found that a light spot was produced. The reversed experiment also was successful. If, however, a spot on the skin of a fish is denervated by cutting its nerves, this spot takes on the color of the rest of the fish only very slowly, due to the slow percolation of the neurohumor produced adjacent to the spot.

So slow is this percolation that Dr. Parker concludes that it does not occur through the blood or the lymph, but must occur by the passage of the secretion from cell to cell.

From an evolutionary standpoint, the newly revealed intercellular system is vastly older than the blood and lymph system of the higher animals. In lower animals such as the coral and the sea anemones which have no blood or lymph, the neurohumor system is the only one existing. It was therefore evolved long before blood started to serve the animal organisms.

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STATISTICS

Homicide Rate Almost Unchanged for 20 Years

FEWER people are dying of typhoid fever than in 1911, more are dying in automobile accidents or from cancer, but they are killing each other at just about the same rate as they did in 1911, the Metropolitan Life Insurance Company has found from a survey of statistics on its policyholders.

The homicide rate has shown almost no change during the past two decades. It is practically the only cause of death that has shown no upward or downward long-time trend. It is the cause of one per cent. of deaths from all causes.

Every case of homicide shows evidence of social disorder. Officers of the company suggest that efforts should be made to determine what factors cause one man to kill another, and that then corrective measures should be applied, just as in the case of diphtheria, malaria and typhoid fever.

Science News Letter, November 19, 1932

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ANATOMY

Rat Brains Cannot Explain Man's Cerebral Functions

Rat's Cerebral Cortex is Primitive, Developed Mainly From Olfactory Centers; Man's Involves Other Senses

RATS, which have served in laboratories to test drugs, vitamins and other substances, can not help the neurologists to solve the old problem of where in the human brain vision and touch and other complicated functions are localized.

Prof. C. Judson Herrick, University of Chicago anatomist, so concluded in a paper read on his behalf before the National Academy of Sciences. The reason is that the cerebral cortex of rats is made on a different plan from the human brain.

"Cerebral cortex is the gray matter of the brain that carries on the complicated associational processes," Dr. Herrick's summary explained. "Fishes and frogs have no well formed cortex and reptiles have a perfect, though small and simple cortex, whose forerunners can be found in fishes and frogs. This true cortex of reptiles was developed from reflex centers for smell. It is not a part of the primitive brain, but was slowly developed when in the course of evolution land animals had to use their wits more than fishes do.

"The first cortex was an olfactory cortex, concerned with associations of odors with other sensory experiences. In lower mammals, like opossums and rats, about half the cortex is also olfactory, but the rest is concerned with associations of other senses. As we pass up the scale toward man, the olfactory cortex gets no bigger, but the non-olfactory cortex gets enormously larger and more complicated. We wonder why this is.

"The fact is, we cannot locate the source of an odor by smell alone, but vision and touch are our localizing senses. The primitive olfactory cortex, accordingly, could be of no use in finding food and avoiding enemies except when working in cooperation with the senses of sight and touch. Its chief function is probably to activate and facilitate the action of the visual and other parts of the cerebral cortex in which each sense has a separate location or center.

"The olfactory cortex acts as a whole; the rest of the cortex does not. If in low mammals, like rats, the non-olfactory cortex is seriously damaged or almost wholly destroyed, the olfactory cortex still is able to facilitate those simple learning processes that can be carried on by the more primitive subcortical parts of the brain-stem. But in man, where the olfactory cortex is only a very small fraction of the whole cortex, severe cortical injury causes more serious disturbance of associational processes. This is because the kinds of learning that we can do are functions of our larger non-olfactory cortex, not merely of the more primitive brain-stem.

"Experiments on learning by rats deprived of part of their cortex show that the loss of most of the non-olfactory cortex does not seriously interfere with learning simple tricks, but it does impair their ability to solve more complicated problems. Most human problems are of still more complicated sorts that cannot be done by the stem part of the brain, not even with the help of general activation or facilitation by the olfactory cortex.

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From Page 319

am engaged in working out the laws according to which atoms and molecules distribute themselves over surfaces forming single layers of atoms. These laws are of importance in understanding many simple phenomena such as those of lubrication and of the spreading of oil films on water.

The forces that hold atoms or molecules on the surfaces of solids or liquids are just as varied in their nature as those forces which determine the chemical and physical properties of substances in bulk. In other words we must recognize that the chemistry and physics of surface phenomena are subjects almost as broad and as complex as the whole field of chemistry and physics. It has too often been thought that a single equation such as a so-called "adsorption iso-

therm" could be devised to cover all surface phenomena.

The importance of this field of surface chemistry is really just beginning to be realized. There is much pioneer experimental and theoretical work to be done to establish even the fundamental principles which should guide investigations of these phenomena. What we need particularly is to study in great detail and with high accuracy a few typical simple examples of adsorption.

Dr. John Bradshaw Taylor and I are attempting to do this through an exhaustive study of the electrical and chemical properties of monatomic films produced on the surface of tungsten filaments when they are brought into contact with vapors of the alkali metal such as caesium or potassium. The effect of adding minute amounts of oxygen is of particular interest. Oxygen and caesium represent substances of two extreme types and so by working with surfaces that contain both kinds of atoms in varying proportions a very wide range of surface phenomena can be investigated.

The delicacy of the methods that can be evolved to detect caesium or oxygen atoms on surfaces is quite extraordinary. For example, it should be quite possible, if desired, to detect the presence of caesium atoms inside a vacuum bulb even if the average concentration of atoms in the space is only about one atom per cubic meter.

We intend to continue such investigations until we have obtained far more fundamental knowledge of surface phenomena than we have at present.

Science News Letter, November 19, 1932

RADIO

LIGHTNING CALCULATION

will be demonstrated by the prodigy

Dr. Salo Finkelstein

of Warsaw, Poland, when interviewed by Dr. Paul S. Achilles, managing director of the Psychological Corporation.

FRIDAY, NOV. 25

at 12:45 P. M., Eastern Standard Time, over stations of the Columbia Broadcasting System. Interview arranged by Science Service.

CHEMISTRY

Huge Tanks of Curious Alcohol Go Begging For Worthy Use

WANTED: A practical use for tertiary butyl alcohol.

This is not an advertisement of surplus depression stocks, nor yet a bid for relief from the Volstead act. Tertiary butyl alcohol is not in the beverage class, though to be sure the chemist has tagged it with a suspicious name.

Following the post-war practice of cracking heavy petroleum to yield gasoline, certain leading oil refiners discovered that several kinds of alcohol could be made economically from the more volatile parts of the cracked oil. These alcohols have proved to be of great value, especially in the lacquer industry.

Unfortunately the oil refiner has to take what Nature gives him when he demolishes the large molecules of cheap, heavy petroleum. An appreciable fraction of one peculiar alcohol, the so-called tertiary butyl variety, turns up regularly by the thousands of gallons, and the present customers do not welcome it. It has eccentric chemical habits which do not fit the solvent industry.

Tertiary butyl alcohol is normally regarded by chemists as an academic curiosity. Its full industrial virtues have undoubtedly not been tested. Like grain alcohol, but unlike most of the newer alcohols, it mixes freely with water. It is readily frozen, more easily than water itself. It evaporates almost as freely as grain alcohol. The partial likeness of tertiary butyl alcohol to the ordinary alcohol suggests that it might be substituted for the latter in some of the host of industries using the older product. Such substitution would be a godsend to manufacturers who at present regard grain alcohol as indispensable, but are seriously hampered by the government prohibition restrictions.

For more than half a century chemists have known the structure of the molecule of the tertiary alcohol to be like a compact bunch of grapes rather than the more slender chains characteristic of its alcoholic brethren. The bunch-like molecular structure has suggested value as an anti-knock motor fuel. It is known that the more compact molecules in petroleum treat high-powered motors more kindly than do the snake-like type of gasoline particles. Tertiary butyl alcohol seems to follow the rule.

Thus it might land in the gas tank, inasmuch as it dissolves freely in motor fuel as well as water. Knowing the more elegant applications of alcohols, however, the chemist hates to run his product into so ignominious a channel at a few cents per gallon. He probably will find a more profitable use for it.

Science News Letter, November 19, 1932

ARCHAEOLOGY

Tunnel at Monte Alban Yields Skeletons and Jewels

A TOMB-LIKE entrance leading to a long underground passage, two skeletons lying far in the depths of this secret passage—these are the latest discoveries announced by Dr. Alfonso Caso, noted Mexican archaeologist who is exploring ruins of ancient Monte Alban, in the state of Oaxaca, Mexico.

The tunnel, which dates from prehistoric times, is only 20 inches high and 24 inches wide, and follows an irregular course up and down. The archaeologists pushed their way 320 feet by crawling on their backs, propelling themselves by elbows and toes. At times they found themselves moving downward head first.

The first skeleton lay 195 feet from the tunnel entrance. In the dust, beside the bones was a necklace of jade, pearls, and red and white onyx beads. The second skeleton was encountered 320 feet from the entrance, and at a blocked end of the passage. This skeleton was broken and incomplete, Dr. Caso reported. With it lay pottery, also broken. Theories have already been advanced to account for Monte Alban's tunnels, of which there are a number. Their discovery recalls old Indian history, which says that armies of Zapotecan Indians had a way of vanishing into secret passages. One theory is that not only troops but supplies might have been transported underground. Finding two burials in one tunnel is considered rather strong evidence that tunnels were tombs in the ancient city.

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CHEMISTRY

Ether Aids in Separation Of Rare Earth Elements

ETHER, widely used as an anesthetic, is finding a new role as the solvent used in separating the rare chemical element, praseodymium, from its most common rare earth chemical sister, neodymium, Prof. B. S. Hopkins of the University of Illinois, discoverer of the element illinium, told the National Academy of Sciences in Ann Arbor.

Water has always been used in the past to separate the members of the rare earth group of elements. Prof. Hopkins explained to the academicians how he is studying the action of other solvents, particularly the alcohols and similar chemicals, in the hope of finding liquids whose solubilities for the anhydrous rare earth chlorides and nitrates will make possible quicker and more complete separations.

His most striking success came through the discovery of the differential solvent action of ethyl ether on neodymium and praseodymium nitrates. At ordinary room temperature (20 degrees Centigrade, 68 degrees Fahrenheit) the praseodymium compound is practically insoluble in the ether while the neodymium nitrate dissolves to the extent of five grams in a liter of ether (about a sixth of an ounce in a quart of ether). By further improved methods Dr. Hopkins believes that it should be possible to use ether to remove the last traces of neodymium from praseodymium, a separation that has been very difficult to bring about by older methods. Praseodymium is rare and it possesses properties which are remarkably similar to those of neodymium.

Ethylene glycol, now used as an antifreeze for autos, may prove useful in bringing about a separation of neodymium and lanthanum. Other solvents are being investigated.

The rare earths include fifteen elements, numbers 57 through 71, the most widely used of which is cerium, which with thorium compounds formed the mantle of Welsbach gas lamps. The element illinium, discovered by Dr. Hopkins a few years ago and named after the State and University of Illinois, is number 61.

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under control as old-fashioned French girls awaiting their parents' pleasure in a marriage of convenience.

When they are ready to carry out the pollination, the botanists load the chosen pollen into a sterilized hypodermic syringe. The needle is plunged through the fabric of the bag, and the fertilizing yellow dust puffed in on the flowers by means of a small rubber bulb. Then the puncture hole is sealed over with a bit of adhesive tape, and the flowers are still left in the bag until they have set their seed and there is no chance of any contaminating foreign pollen getting in.

It has been learned that pine pollen will keep for a year or more, so that pollens can be stored from one season to the next, or brought from as far away as India to use in making hybrids with western American pines.

Science News Letter, November 19, 1932

PALEONTOLOGY

Modern Hawk's Skull in 35,000,000 Year Old Rocks

SOME birds did their evolving early. New evidence on this point was presented at the meeting of the National Academy of Sciences in Ann Arbor by Dr. Alexander Wetmore of the U. S. National Museum and Prof. E. C. Case of the University of Michigan.

They reported on the discovery of the skull of a hawk of fully modern type in the Badlands of South Dakota, in rocks of the oligocene geologic period, which began some 35,000,000 years ago, according to estimates based on earth radioactivity. The skull belonged to a bird of the genus *Buteo;* modern representatives of this group include such well-known species as Swainson's hawk, the red-tailed hawk and the broad-winged hawk.

Science News Letter, November 19, 1932

ENGINEERING

Tires Inflated With Carbon Dioxide

MANY German motorists no longer carry emergency tire pumps, states the German scientific journal *Technische Blätter.* Instead, they carry small cylinders of compressed carbon dioxide, equipped with hoses and suitable nozzles. Each cylinder will serve for several inflations.

Science News Letter, November 19, 1932

BOTANY

NATURE RAMBLINGS by Frank Thone

Strictly American

AFTER the turkey has been stripped to his framework and the cranberry sauce and sweet potatoes and all the rest of the "fixin's" have departed with him, the Thanksgiving feast is appropriately rounded off with pumpkin pie. Even the least forethoughtful of small boys will have left a corner somewhere into which he can drive a wedge of it.

The fruit pie is a typically American dessert, and the pumpkin is a typically American pie material. Europeans know it not; they are abashed and embarrassed in its presence. There is a tale that a member of Sara Bernhardt's entourage once informed the great diva that pumpkin pie is "the American national cake." But it is as natural for an American to demolish pumpkin pie as it is for him to turn a deaf ear—or radio dial—to patriotic orators.

The typical farm scene, of orange-yellow pumpkins littered among dun-colored cornshocks, was American while the Pilgrim Fathers were still Englishmen. For the Indians cultivated corn and pumpkins together exactly as we do today, and when the white men came they learned this agricultural trick from the red men. Though there is little doubt that pumpkins originated on this continent, they are not known anywhere in the wild state. Like the corn they grow with, the Indians had them in cultivation but knew nothing of their source when the white man first arrived. Unlike corn, however, pumpkins have relatives all over the world. But the yellow pumpkin that makes our pies is still of straight American ancestry.

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his own name so that each would be assured of such scientific recognition as his work merited.

The Nobel Prize award in chemistry to Dr. Irving Langmuir proves that important fundamental research can thrive in an industrial laboratory and that it is possible for a man connected with such a laboratory to receive the highest public recognition.

The scientific world is familiar with the many important contributions to science that Langmuir has made, and the general public, knowing of the major applications of the results of his researches, has clear evidence that fundamental research may be made to pay.

But only those in our laboratory can properly appreciate the value of another phase of Dr. Langmuir's work. While through his own researches he has been making large contributions to the growth of fundamental knowledge, he has been constantly helpful to others, not only in our own organization but also outside of it.

While most of his own efforts have been directed to fundamental research in physics and chemistry he has always been interested in the application of scientific knowledge to human needs, and the same brilliancy in analysis, in reasoning, and in scientific imagination which has enabled him to achieve so much in basic research, has always been applied generously and helpfully to the multifarious practical problems of his associates in the laboratory.

Langmuir's work shows that a man can serve science greatly and at the same time serve industry both by broadening the basis on which that industry rests and by the application of fundamental scientific methods to practical problems.

The Nobel award to Langmuir should be helpful to both science and industry. It should stimulate industry to seek for scientific workers of the highest ability and to support their efforts, and it should reassure scientists that by accepting such support they are not precluding themselves from that recognition they most value, the recognition of merit in their work by fellow scientists.

Science News Letter, November 19, 1932

A white leghorn pullet, owned in New York State, has laid 355 eggs weighing 27½ ounces to the dozen, thus breaking the world's record for egg weight and coming within two eggs of tying the record for the number of eggs.

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•First Glances at New Books

Physics

MODERN PHYSICS—G. E. M. Jauncey—*Van Nostrand,* 568 p., $4. To introduce the student who has finished an introductory general course in physics to such "live" matters as X-rays, the quantum theory, cosmic rays, relativity, radio, television, astrophysics, and geophysical prospecting, this text has evolved at Washington University from mimeographed notes. Prof. Jauncey believes that the best time to introduce a student to modern physics is in his second year as a physics student.

Science News Letter, November 19, 1932

Psychology

STUDIES IN THE DYNAMICS OF BEHAVIOR—Calvin P. Stone, Chester W. Darrow, Carney Landis, and Lena L. Heath—*University of Chicago Press,* 332 p., $5. One of the series of Behavior Research Fund Publications, this volume includes three studies. The first, by Dr. Stone, attacks the problem of the genetic origin of temperamental differences. Dr. Darrow and Miss Heath show a relation between certain types of electrical responses of the body and definite traits of character. And Dr. Landis has studied the relation between emotional traits and juvenile delinquency.

Science News Letter, November 19, 1932

Paleontology

THE CANADIAN AND ORDOVICIAN FORMATIONS AND FOSSILS OF SOUTH MANCHURIA—Riuji Endo—*Govt. Print. Off.,* 152 p., 40 pl., 4 maps, 50c. A monograph of more than ordinary interest to paleontologists.

Science News Letter, November 19, 1932

Psychology-Education

PRINCIPLES OF MENTAL DEVELOPMENT—Raymond Holder Wheeler and Francis Theodore Perkins—*Crowell,* 529 p., $3.75. A book on child psychology and the learning process based on Gestalt concepts. Though intended as a textbook for teachers, it is an excellent reference work and should be of great interest to parents and the general reader.

Science News Letter, November 19, 1932

Ornithology

THE BIRDS OF MINNESOTA—Thomas S. Roberts—*Univ. of Minnesota Press,* vol. I, xxii + 691 p., 50 colored pl.; vol. II, xv + 821 p., 42 colored pl.; $6. A complete and detailed account of the birds of Minnesota, which will of course be of use throughout the upper Mississippi Valley and of high reference value throughout the country. The author, who is professor of ornithology and director of the natural history museum at the University of Minnesota, has made this a truly monumental work, interesting to the amateur and even to the casual reader, yet of genuinely scientific usefulness to the professional. In addition to the wealth of splendid colored plates there are hundreds of text illustrations. The second volume includes a complete descriptive key.

Science News Letter, November 19, 1932

Economics

AN INTERNATIONAL ENQUIRY INTO COSTS OF LIVING—*World Peace Foundation (Boston),* 210 p., $2. A comparative study of workers' living costs in Detroit and fourteen European cities.

Science News Letter, November 19, 1932

Sociology

AN HYPOTHESIS OF POPULATION GROWTH—Ezra Bowen — *Columbia Univ. Press,* 238 p., $3.75. "It is contended. . . that forces and influences operating upon the growth of population may be reduced to two overwhelmingly significant—and perhaps all-inclusive—factors, wealth and living-standards, and that a formula predicated on those two factors should prove helpful in promoting an understanding of the intricacies of population growth."

Science News Letter, November 19, 1932

Ethnology

YUMAN AND YAQUI MUSIC—Frances Densmore—*Govt. Print. Off.,* 216 p., 31 pl., 40c. Among Yuman tribes of the Colorado River valley and the Yaquis in Arizona Miss Densmore collected the 130 songs published and described in this monograph. Musical customs of these tribes are peculiar, the ethnologist found. Although comparatively near Pueblo and Californian Indians, the Yuman tribes have been shut in by desert and mountains so that their civilization is distinct from that of other Southwesterners.

Science News Letter, November 19, 1932

Psychology

THE NATURE OF HUMAN CONFLICTS—A. B. Luria—Transl. and ed. by W. Horsley Gantt—*Liveright,* 431 p., $4. This volume makes available in English a wealth of laboratory data which may serve as an aid in the understanding of the complex problem of human behavior. The author's investigations of criminals and his suggestions for the control of human behavior are of particular interest.

Science News Letter, November 19, 1932

Ethnology

THE SWIMMER MANUSCRIPT—James Mooney and Frans M. Olbrechts—*Govt. Print. Off.,* 319 p., 50c. Some 40 years ago the late James Mooney of the Bureau of American Ethnology discovered a rare Cherokee Indian work on medicine. The Indian who had compiled the formulae for treating disease was known as "the swimmer," hence the name now given the manuscript. Mr. Mooney's task of transliteration and translation from the Cherokee writing has been brought to completion by Frans Olbrechts and this publication dealing with 96 formulae is the result.

Science News Letter, November 19, 1932

Psychology

THE MIND IN ACTION—A. Campbell Garnett—*Appleton,* 226 p., $2. A "study of motives and values" written, as the author tells us, with the principles of Spearman as a starting point, but presenting other important theories.

Science News Letter, November 19, 1932

Biology

EVERYDAY PROBLEMS IN BIOLOGY—C. J. Pieper, W. L. Beauchamp and O. D. Frank—*Scott, Foresman,* 686 p., $1.60. A well-thought-out, clearly written textbook for high school use.

Science News Letter, November 19, 1932

Electricity

PRACTICAL ELECTRICITY FOR BEGINNERS—George A. Willoughby—*Manual Arts Press,* 104 p., $1. The second edition of a concise text and manual which treats electricity as applied to lighting, doorbells and automobiles.

Science News Letter, November 19, 1932

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